

AP20 Rec'd 25/5/06 05 JUN 2006

Re Point V

Reasoned statement with regard to novelty, inventive step, and industrial applicability; citations and explanations supporting this statement

1. Reference is made to the following documents:

D1: U.S.-A-4,593,578

2. Document D1 is regarded as the most proximate related art with respect to the subject matter of Claims 1 and 16. It discloses (the references in parentheses relate to this document):

- 2.1 Document D1 discloses (the references in parentheses relate to this document): a device for pressing a rack (2) onto a pinion using a pressure piece (7) and a stop element (4), a spring element (6), which is arranged between the pressure piece (7) and the stop element (4), exerting the first stage of at least two consecutive stages of the pressure, which press the pressure piece (7) against the rack (2), that the pressure piece (7) and the stop element (4) each have contact faces oriented toward each other, which in a basic position are located at a distance with respect to each other.

The subject matter of Claim 1 thus differs from the known device in that the pressure piece and the stop element are made of metal, the contact face of the stop element is configured to be springy such that the second stage of the pressure sets in as soon as the contact faces contact each other, the pressure piece and the stop element each have a second contact face oriented toward each other, which in a basic position have a distance with respect to

each other that is greater than the distance of the first contact faces with respect to each other, the second contact faces being configured in such a way that they constitute an end stop for the movement of the pressure piece.

- 2.2 Document D1 discloses (the references in parentheses relate to this document): a device for pressing a rack (2) onto a pinion using a pressure piece (7) and a stop element (4), that the pressure piece (7) and the stop element (4) each have contact faces oriented toward each other.

The subject matter of Claim 16 thus differs from the known device in that the pressure piece and the stop element are made of metal, the pressure piece and the stop element each have contact faces oriented toward each other, which in the basic position are contiguous with each other, the contact face of the stop element is configured to be springy, the pressure piece and the stop element each have a second contact face oriented toward each other, which in the basic position have a distance with respect to each other and are configured in such a way that they constitute an end stop for the movement of the pressure piece.

- 3 The objective to be achieved by the present invention can thus be seen to lie in the reduction of the play of the pressure piece and in the minimization of the noises produced. This combination of features is neither known from the available related art, nor rendered obvious by it. Therefore, the provided means for achieving the objective is inventive. Consequently, Claim 1 and 16 and

dependent Claims 2 through 15 and 16 through 25 satisfy
the requirements of Articles 33(2) and 33(3).

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Reasoned statement with regard to novelty, inventive step, and industrial applicability; citations and explanations supporting this statement

1. Reference is made to the following documents:

D1: U.S.-A-4,593,578

D2: DE 199 37 253 A1

D3: U.S.-A-4,785,685

D4: U.S.-A-4,400,991

2. Document D1 is considered to be the most proximate related art with respect to the subject matter of Claim 1. It discloses (the references in parentheses relate to this document): a device for pressing a rack (2) onto a pinion using a pressure piece (7) and a stop element (4), a spring element (6), which is situated between the pressure piece (7) and the stop element (4), exerting the first stage of at least two consecutive stages of the pressure, which press the pressure piece (7) against the rack (2), that the pressure piece (7) and the stop element (4) each have contact faces oriented toward each other, which in a basic position are located at a distance with respect to each other, at least one of the contact faces (7e,7b) being configured to be springy such that the second stage of the pressure sets in as soon as the contact faces contact each other. The subject matter of Claim 1 is thus not novel (Article 33 (2) PCT).

3. Document D1 also discloses the particular features of Claims 4, 5, 8 and 11 through 13. The subject matter of Claims 4, 5, 8 and 11 through 13 is thus not novel (Article 33(2) PCT).

The subject matter of Claims 9 and 10 lies in the selection of a range. Such a selection, however, can only be regarded as inventive if [it] has unexpected effects or properties in comparison with the rest of the range. Such effects or properties, however, are not indicated in the application. Therefore, the subject matter of Claims 9 and 10 is not based on an inventive step.

4. A similar objection as under Point 2 is raised with respect to Claim 1 on the basis of D2: the pressure piece and the housing bushing are made of sheet metal, and sheet metal is elastic. Document D2 also discloses the additional features of Claims 2, 3, 6, 7, 14 through 16 and 18. The subject matter of Claims 2, 3, 6, 7, 14 through 16 and 18 is thus not novel (Article 33(2) PCT).

The features of Claim 17, however, were already used for the same purpose in a similar pressure piece unit, cf. document D3 in this regard. If one skilled in the art wants to achieve the same purpose in a pressure piece unit according to document D2, it is easily possible for him to use the features with corresponding effect for the subject matter of D2 as well. In this manner, he would arrive at a pressure piece unit according to Claim 17 without an inventive step. The subject matter of Claim 17 is therefore not based on an inventive activity.

5. Document D4 is regarded as the most proximate related art with respect to the subject matter of Claim 19. It discloses (the references in parentheses relate to this document): A device for pressing a rack (3) onto a pinion (2) using a pressure piece (5) and a stop element (13), that the pressure piece (5) and the stop element (13)

each have contact faces oriented toward each other, which in a basic position (of Drawing 1) are contiguous with each other, at least one of the contact faces being configured to be springy. The subject matter of Claim 19 is thus not novel (Article 33 (2) PCT).

6. Document D4 also discloses the particular features of Claims 20 through 23 and 25. The subject matter of Claims 20 through 23 and 25 is therefore not novel (Article 33 (2) PCT).
7. A similar objection as under Point 5 is raised with respect to Claim 19 on the basis of D1: the term "of a basic position" used in Claims 19 is vague and unclear, and leaves the reader in the dark about the meaning of the relevant technical feature. Document D1 also discloses the additional features of Claims 26 through 30. Therefore, the subject matter of Claims 26 through 30 is not novel (Article 33(2) PCT).
8. The feature combination contained in dependent Claim 24 is neither known from the available related art nor is it anticipated by it, and Claim 24 thus also fulfills the requirements of the PCT with respect to novelty and inventive step.

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Patent Claims

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1. A device for pressing a rack onto a pinion, having a pressure piece and a stop element, a spring element which is arranged between the pressure piece and the stop element exerting the first stage of at least two stages of the pressure which follow one another and press the pressure piece against the rack, the pressure piece and the stop element in each case having contact faces which are oriented toward one another and are arranged at a distance from one another in a basic position,

15 characterized in that

1.1 the pressure piece (2) and the stop element (3) are formed from metal,

1.2 the contact face (17b) of the stop element (3) is of resilient configuration, with the result that the second stage of the pressure begins as soon as the contact faces (17a, 17b) make contact with one another, and

1.3 the pressure piece (2) and the stop element (3) each have a second contact face (18a, 18b) which are oriented toward one another and, in the basic position, are at a distance from one another which is greater than the distance of the first contact faces (17a, 17b) from one another, the second contact faces (18a, 18b) being configured in such a way that they represent an end stop for the movement of the pressure piece (2).

2. The device as claimed in claim 1, characterized in that the pressure piece (2) has a circumferential surface (5) and a pin (7) which protrudes in the

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direction of the stop element (3) and the exposed end of which is configured as a contact face (17a).

3. The device as claimed in claim 2, characterized in that the pin (7) extends coaxially with respect to the axis of the pressure piece (2).

4. The device as claimed in claim 1, 2 or 3, characterized in that the stop element (3) has an annular circumferential surface (14) and an end wall (15) which is configured as a contact face (17b).

5. The device as claimed in claim 4, characterized in that the spring element (4) is arranged substantially within a hollow space of the pressure piece (2) and is clamped between a base part (6) of the pressure piece (2) and the end wall (15) of the stop element (3).

6. The device as claimed in claim 5, characterized in that the spring element is configured as a helical spring (4), in the center of which the pin (7), starting from the base part (6) of the pressure piece (2), extends in the direction of the end wall (15).

7. The device as claimed in one of claims 2 to 6, characterized in that the pin (7) is configured in one piece with the pressure piece (2).

8. The device as claimed in one of claims 1 to 7, characterized in that the distance between the first contact face (17a) of the pressure piece (2) and the first contact face (17b) of the stop element (3) is from 0.02 mm to 0.1 mm, preferably 0.05 mm, in the basic position.

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9. The device as claimed in one of claims 1 to 8, characterized in that the distance of the second contact face (18a) of the pressure piece (2) from the second contact face (18b) of the stop element (3) is from 0.15 mm to 0.3 mm, preferably 0.2 mm, in the basic position.

10. The device as claimed in one of claims 2 to 9, characterized in that the exposed end, which is oriented in the direction of the stop element (3), of the circumferential surface (5) of the pressure piece (2) is configured as a second contact face (18a).

11. The device as claimed in one of claims 1 to 10, characterized in that the end, which is oriented in the direction of the pressure piece (2), of the annular circumferential surface (14) of the stop element (3) is configured as a second contact face (18b).

12. The device as claimed in one of claims 1 to 11, characterized in that the pressure piece (2) is arranged in a receptacle space (8) of a steering housing (9), a sliding foil (10) being arranged between the inner wall of the receptacle space (8) and the circumferential surface (5) of the pressure piece (2).

13. The device as claimed in claim 12, characterized in that the sliding foil (10) has a sliding base (11) as a bearing point for the rack (1).

14. The device as claimed in claim 12 or 13, characterized in that the sliding foil (10) is arranged in the receptacle space (8) by means of an interference fit.

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15. The device as claimed in claim 12, 13 or 14, characterized in that the stop element is configured as a setting screw (3) which can be screwed into the receptacle space (8).

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16. A device for pressing a rack onto a pinion, having a pressure piece and a stop element, the pressure piece and the stop element in each case having contact faces which are oriented toward one another,

10 characterized in that

16.1 the pressure piece (2) and the stop element (3) are formed from metal;

16.2 the pressure piece (2) and the stop element (3) in each case have contact faces (17a, 17b) which are oriented toward one another and bear against one another in a basic position;

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16.3 the contact face (17b) of the stop element (3) is of resilient configuration;

16.4 the pressure piece (2) and the stop element (3) each have a second contact face (18a, 18b) which are oriented toward one another and, in the basic position, are at a distance from one another and are configured in such a way that they represent an end stop for the movement of the pressure piece (2).

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17. The device as claimed in claim 16, characterized in that the pressure piece (2) has a circumferential surface (5) and a pin (7) which protrudes in the direction of the stop element (3) and the exposed end of which is configured as a contact face (17a).

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18. The device as claimed in claim 16 or 17, characterized in that the pin (7) extends coaxially with respect to the axis of the pressure piece (2).

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19. The device as claimed in claim 16, 17 or 18, characterized in that the stop element (3) has an annular circumferential surface (14) and an end wall (15) which is configured as a contact face (17b).

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20. The device as claimed in claim 19, characterized in that the contact face (17b) of the stop element (3) is deflected or clamped in the basic position by the contact face (17a) of the pin (7).

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21. The device as claimed in one of claims 17 to 20, characterized in that the contact face (17a) of the pin (7) is of cambered configuration in order to generate a progressive spring characteristic diagram.

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22. The device as claimed in one of claims 17 to 21, characterized in that the pin (7) is configured in one piece with the pressure piece (2).

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23. The device as claimed in claim 17 and one of claims 17 to 22, characterized in that the exposed end, which is oriented in the direction of the stop element (3), of the circumferential surface (5) of the pressure piece (2) is configured as a second contact face (18a).

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24. The device as claimed in one of claims 17 to 23, characterized in that the end, which is oriented in the direction of the pressure piece (2), of the annular circumferential surface (14) of the stop element (3) is configured as a second contact face (18b).

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25. The device as claimed in one of claims 16 to 24, characterized in that the stop element is configured as a setting screw (3).